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Pathogenetic Basis of Placental-Uterine Blood Flow Disorders

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ABSTRACT

The physiological development of the placenta depends on sufficient oxygenation and metabolism through the placenta, which is provided by hemochoric placentation. This requires the appropriate transformation of the maternal spiral arteries of the myometrium by trophoblast during its invasion. As a result, optimal contact between the uterus and placenta and a well-developed vascular network are formed, which directly depends on the successful invasion of the trophoblast, the processes of vasculogenesis and angiogenesis. The blastocyst can be implanted into the endometrium within a relatively short period of time, called the "implantation window".

KEYWORDS: *In addition to endocrine regulation by ovarian hormones, the preparation of the functional layer of the endometrium is also affected by the receptivity of endometrial cells*

The correct quantitative and qualitative relationships between ovarian steroid hormones and their receptors in the endometrium make it possible to create optimal conditions for implantation of a blastocyst. The readiness of the endometrium is determined by the processes of apoptosis of endometrial cells, regulated by growth factors and proinflammatory cytokines. At the ultramicroscopic level, changes in endometrial cells during the "implantation window" are accompanied by the formation of pinopodia – microscopic outgrowths on the surface of epithelial cells. It has been established that pinopodia appear from the middle of the luteal phase and signaling interactions between the endometrium and the embryo occur at the site of their formation. It is assumed that the main receptors for blastocyst attachment are located on the surface of the pinopodia. The readiness of the endometrium for implantation is also affected by the state of blood circulation in the vessels of the uterus. Endometrial vascularization is constantly changing depending on the phase of the menstrual cycle and is closely related to changes in the endometrium itself in response to the effect of sex steroids. Estrogens stimulate VEGF expression, and they are significantly higher in glandular tissue than in stromal tissue. The most intensive blood supply to the uterus is observed at the maximum functional activity of the corpus luteum, i.e. at the time of the most probable implantation. In a number of patients with a disturbed menstrual cycle during the "implantation window", thinning of the endometrium less than 7 mm is determined, in which highly resistant blood flow in the uterine vessels and a significant decrease in visualization of the basal and spiral arteries are revealed. A high resistance index in medium-caliber arteries leads to a deterioration in the growth of the glandular epithelium and a decrease in the level of VEGF in the endometrium, which contributes to a further decrease in blood flow velocity and impaired endometrial receptivity. However, there was no relationship between the blood flow in the uterine vessels and the histological structure of the endometrium. The accumulation of VEGF is associated with physiological cyclic angiogenesis in the endometrium and is important in the development of the subepithelial capillary plexus and microvessels of the functional layer in the proliferative phase of the menstrual cycle. Intravascular sources of VEGF are neutrophils, extravascular – glandular epithelium and endometrial stroma cells. The issue of the effect of endometriosis, chronic endometritis, congenital anomalies of uterine development on the receptivity of the endometrium is discussed. Recently, much attention has been paid to the study of invasive processes of trophoblast and gestational restructuring of the spiral arteries of the uterus. It was determined that the basis of obstetric complications and perinatal outcomes is the insufficiency of the placental bed of the uterus due to incomplete gestational changes in the endo- and myometrial segments of the uteroplacental arteries. Based on a histometric study, an indicator of the degree of gestational restructuring of the spiral arteries is proposed, which reflects the state of blood supply to the uteroplacental region. The morphology of the placental region was studied against the background of compensated placental insufficiency. There is no complete gestational restructuring of the spiral arteries, with the predominance of arteries with narrowed lumen endosclerosis. Cytotrophoblast invasion into the myometrium is weak. Increased proliferative activity of cytotrophoblast in conditions of subcompensated placental insufficiency contributes to faster formation of uteroplacental arteries, increased blood flow into the interstitial space, as well as acceleration of villous vascularization. During vasculogenesis, the differentiation of mesenchymal progenitor cells into hemangioblasts and their further differentiation into endothelial cells are controlled by the growth factors VEGF (vascular endothelial growth factor) and its VEGFR receptors. Further formation of the placental vascular network is carried out by angiogenesis. VEGF and Pl (placental growth factor) play a key role in the regulation of placental vascular angiogenesis and endothelial cell proliferation. As uncomplicated pregnancy progresses, the level of VEGF in maternal blood increases throughout the gestation period, with a maximum rate after 30 weeks. PlGF levels peak towards the end of the second trimester of pregnancy, then decrease. In the late stages of angiogenesis, macrophages, fibroblasts and smooth muscle cells secrete antiangiogenic factors that inhibit the migration and proliferation of endothelial cells without reducing their viability. Survival and apoptosis of endothelial cells are opposite processes, but necessary for angiogenesis, which are regulated by a balance of proangiogenic and antiangiogenic factors. At the initial stages of placental development, there is a predominance of non-branching angiogenesis, which is then replaced by the processes of branching angiogenesis. At the final stages of the placenta's existence, the vascular network develops due to the balance

between branching and non-branching angiogenesis. Violation of this balance leads to the pathological severity of one of the mechanisms of angiogenesis and disruption of the normal structure of the placental vascular network. Thus, for the normal development and functioning of the placenta, it is important to balance between the various mechanisms of angiogenesis, as well as the balance between the processes of angiogenesis and apoptosis, which are supported by the ratio of proangiogenic and antiangiogenic factors secreted by both endothelial cells and microenvironment cells. A change in the balance of cytokines and growth factors in the microenvironment of endothelial cells underlies pathological disorders of placentation. For example, an increase in VEGF activity was revealed against the background of a decrease in specific VEGFR-2 receptors in samples obtained from patients with placenta accreta. Violation of this balance leads to the pathological severity of one of the mechanisms of angiogenesis and disruption of the normal structure of the placental vascular network. Thus, for the normal development and functioning of the placenta, it is important to balance between the various mechanisms of angiogenesis, as well as the balance between the processes of angiogenesis and apoptosis, which are supported by the ratio of proangiogenic and antiangiogenic factors secreted by both endothelial cells and microenvironment cells. A change in the balance of cytokines and growth factors in the microenvironment of endothelial cells underlies pathological disorders of placentation. For example, an increase in VEGF activity was revealed against the background of a decrease in specific VEGFR-2 receptors in samples obtained from patients with placenta accreta. The most pronounced changes in the production of vascular growth factors were detected in patients with severe forms of gestosis, sub- and decompensated placental insufficiency. Determination of the level of growth factors in the blood serum of pregnant women allows predicting the development and clarifying the severity of gestosis and placental insufficiency for choosing obstetric tactics and delivery dates. In women with developed complications during pregnancy, lower rates of placental growth factors were found in the early stages. PLGF decreases in 2-3 weeks. before the onset of metabolic disorders in the placenta. The peculiarities of the secretion of pro- and anti-angiogenic factors in the first trimester of pregnancy in women with a history of habitual miscarriage were studied. According to the results of the study, a higher level of VEGF was established during three waves of chorionic invasion in women with miscarriage who received pregravidar preparation with progestogens and metiprednisolone. There was an increased secretion of antiangiogenic VEGFR-1 in the first wave of chorionic invasion compared with women who had a history of physiological childbirth. There was a strong direct relationship between the level of VEGF with the thickness of the chorion and the level of VEGFR-1 with the formation of retrochorial hematomas. The levels and VEGFR-2 did not differ. Thus, the angiogenesis-stimulating effect of methylprednisolone causes supraphysiological secretion of proangiogenic VEGF, inhibits the high secretion of antiangiogenic VEGFR-1 in the formation of a full chorionic vascular network. The morphological characteristics of the villous chorion in spontaneous abortion and non-developing pregnancy in the first trimester of pregnancy were compared. Villous chorion and endometrium in spontaneous abortion are characterized by a predominance of villi with foci of stroma necrosis, a significant decrease in vascularization of the villous chorion, a large number of villi minimal in area, a slowdown in the transformation of decidual cells with a predominance of immature and maturing types of cells. Morphological criteria of non-developing pregnancy: predominance of chorionic villi with sclerosis and stroma fibrosis, hypo- and avascularization of villi, disorders of differentiation and transformation of decidual cells. According to the results of the placenta study, the authors express an opinion on the effect of gestosis on chronic disorders of maternal and fetal circulation, impaired maturation of villi, inflammation and dystrophic changes, which, in combination with post-inflammatory sclerosis of the stroma of the villi, contributes to the development of hypoxic-ischemic brain damage and the formation of fetal growth retardation. Immunohistochemical examination of placentas in obese women showed a more pronounced expression of VEGF and its VEGFR-2 receptor compared to normal placentas, while the predominance of angiogenesis without vascular branching was revealed. Researchers explain such changes by the inhibitory effect of high concentrations of lipids and blood glucose on the binding of VEGF receptors. Thus, for normal placentation and placenta development during gestation, the readiness of the endometrium is necessary, which is determined by the state of endocrine regulation by ovarian hormones, receptivity and apoptosis of endometrial cells, blood flow at the level of the basal and spiral arteries of the uterus. Preimplantation endometrial inferiority is the cause of impaired vasculogenesis and angiogenesis in the formation of the placental vascular network. A few mechanisms are important in the regulation of angiogenesis, but the key ones are angiogenic (VEGF and PlGF) and antiangiogenic (VEGFR-1 and VEGFR-2) factors, the imbalance between which leads to the development of pathological placentation and placental insufficiency.

References:

[1] Бурлев В.А., Ильясова Н.А., Шишканова О.Л. Циклический ангиогенез эутопического эндометрия // Проблемы репродукции. – 2006. - № 6. – С. 22-30.

[2] Волкова Е.Ю., Корнеева И.Е., Силантьева Е.С. Роль маточной гемодинамики в оценке рецептивности эндометрия // Проблемы репродукции. – 2012. – № 2. – С. 57-62.

[3] Sarkisova V. ASPECTS OF THE STATE OF THE AUTONOMIC NERVOUS SYSTEM IN HYPOXIA //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 977-982.

[4] Sarkisova V. et al. ESSENTIAL ROLE OF BRADIKININ IN THE COURSE OF BASIC LIFE PROCESSES //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 576-581.

[5] Sarkisova V. et al. ESSENTIAL ROLE OF BRADIKININ IN THE COURSE OF BASIC LIFE PROCESSES //Science and Innovation. – 2022. – Т. 1. – №. 8. – С. 576-581.

[6] Sarkisova V., Xegay R., Numonova A. ENDOCRINE CONTROL OF THE DIGESTION PROCESS. GASTROINTESTINAL ENDOCRINE CELLS //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 582-586.

[7] Sarkisova V., Xegay R. CAUSES, DIAGNOSIS, CONSERVATIVE AND OPERATIVE TREATMENT OF UTERINE MYOMA //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 198-203.

[8] Vladimirovna S. V. ABOUT THE CAUSES OF ENDOMETRIAL HYPERPLASIA AND FORMS OF ENDOMETRIAL HYPERPLASIA //ResearchJet Journal of Analysis and Inventions. – 2022. – Т. 3. – №. 11. – С. 66-72.

[9] Sarkisova V., Regina X. РОЛЬ БРАДИКИНИНА В ПРОТЕКАНИИ ОСНОВНЫХ ЖИЗНЕННЫХ ПРОЦЕССОВ //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 587-593.

[10] Sarkisova V., Numonova A., Xegay R. АНТИБИОТИКОРЕЗИСТЕНТНОСТЬ ИЛИ БОРЬБА С ГЛОБАЛЬНОЙ УГРОЗОЙ XXI ВЕКА //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 232-241.

[11] Sarkisova V., Numonova A., Xegay R. АСПЕКТЫ СОСТОЯНИЯ ВЕГЕТАТИВНОЙ НЕРВНОЙ СИСТЕМЫ ПРИ ГИПОКСИИ //Science and innovation. – 2022. – Т. 1. – №. D8. – С. 228-231.

[12] Ermatov N. et al. Expression of tissue-specific genes in mice with hepatocarcinogenesis //International Journal of Pharmaceutical Research. – 2020. – Т. 12. – №. 3. – С. 1776-1781.

[13] Джалалов Д. Д., Хасанова М. А. ВИНОГРАДНЫЙ ЛЕКТИН И ГРУППА КРОВИ СИСТЕМЫ АВО //Врач-аспирант. – 2011. – Т. 44. – №. 1. – С. 51-55.

[14] Хасанова М. А., Арзуманов В. А. Содержание лектинов в генеративных органах винограда по фазам вегетации в зависимости от сорта //Виноделие и виноградарство. – 2010. – №. 4. – С. 42-43.

[15] ХАСАНОВА Д. А., РУЗИЕВ Ш. И. НОВЫЙ ДЕНЬ В МЕДИЦИНЕ //НОВЫЙ ДЕНЬ В МЕДИЦИНЕ Учредители: Бухарский государственный медицинский институт, ООО" Новый день в медицине". – №. 1. – С. 157-160.

[16] Хасанова М. А., Бахриев И. И., Турдиев Н. Т. ОБНАРУЖЕНИЕ АНТИГЕНОВ СИСТЕМЫ АВО В ВОЛОСАХ //От фундаментальных знаний к тонкому владению скальпелем. – 2019. – С. 49-51.

[17] Tujchibaeva N. M. Islamova Sh. A., Shigakova LA, Otaeva NT Drugresistant epilepsy. Mechanismsandcauses //Infekciya, immunitet i farmakologiya. – 2014. – Т. 4. – С. 123-129.

[18] Kurbanov A. K. et al. The studyof. – 2022.

[19] Халиков П. Х. и др. ЦИТОГЕНЕТИЧЕСКИЙ МЕТОД В ИЗУЧЕНИИ НАСЛЕДСТВЕННОСТИ ЧЕЛОВЕКА //Journal of Integrated Education and Research. – 2023. – Т. 2. – №. 1. – С. 15-18.

[20] Kurbanov A. K. et al. Study of Working Conditions and Environmental Pollution, When Applying The Herbicide Zellec //International Journal of Scientific Trends. – 2022. – Т. 1. – №. 2. – С. 91-94.

[21] Х Р.М., Шигакова Л.А., Ж К.К. Изучение взаимосвязи гипо- и гиперкальциемии вещества на развитие зубов в раннем постнатальном онтогенезе. – 2022.

[22] Леднев В.А., Шигакова Л.А. АКТУАЛЬНЫЕ ВОПРОСЫ МЕДИЦИНСКОЙ ГЕНЕТИКИ XXI ВЕКА. – 2022.

[23] Халиков П. Х., Курбанов А. К., Шигакова Л. А. Коррекция генетического эффекта далапона (ГЕРБИЦИД) с помощью экстактоврастений :дис. – Ўзбекистон, Тошкент, 2022.

[24] Шигакова Л. А., Иванова Л. Е. Актуальные вопросы медицинской генетики XXI века. – 2022.

[25] Таринова М. В., Шигакова Л. А., Набиева З. Б. ИСПОЛЬЗОВАНИЕ УЧЕБНОЙ РАБОЧЕЙ ТЕТРАДИ-ОДИН ИЗ ВОЗМОЖНЫХ МЕТОДОВ СОВЕРШЕНСТВОВАНИЯ ПЕДАГОГИЧЕСКИХ ТЕХНОЛОГИЙ //Интернаука. – 2021. – №. 5-1. – С. 70-71.

[26] Рахматова М. Х., Таринова М. В., Шигакова Л. А. ВЛИЯНИЕ ЩИТОВИДНОЙ ЖЕЛЕЗЫ НА СОСТОЯНИЕ ЗУБОЧЕЛЮСТНОЙ СИСТЕМЫ: ЛИТЕРАТУРНЫЙ ОБЗОР //Интернаука. – 2021. – №. 4-1. – С. 41-44.

[27] Shodiyeva D., Shernazarov F. ANALYSIS OF THE COMPOUNDS PROVIDING ANTIHELMITIC EFFECTS OF CHICHORIUM INTYBUS THROUGH FRACTIONATION //Science and innovation. – 2023. – Т. 2. – №. D2. – С. 64-70.